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Original citation:
Stevenson, I & Marintseva, K 2019, 'A review of Corporate Social Responsibility assessment and reporting techniques in the aviation industry', Transportation Research Procedia, vol. 43, pp. 93-103.
https://dx.doi.org/10.1016/j.trpro.2019.12.023

DOI 10.1016/j.trpro.2019.12.023
ISSN 2352-1465

Publisher: Elsevier

Available online at www.sciencedirect.com

ScienceDirect

Transportation Research Procedia 43 (2019) 93–103

Transportation Research Procedia

www.elsevier.com/locate/procedia

8th International Conference on Air Transport – INAIR 2019
GLOBAL TRENDS IN AVIATION

A review of Corporate Social Responsibility assessment and reporting techniques in the aviation industry

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Abstract

Problems of developing meaningful Corporate Social Responsibility (CSR) assessment and reporting have been discussed in academic papers since the 1950s. However, questions of understanding the value of CSR, the assessment and reporting techniques used, the methods for rating companies for their contribution to CSR, from both the e organisational and consumer's points of view, remain open. Different philosophies, the history of business formation, along with issues of organisational culture, gives rise to heterogeneous models and, accordingly, different approaches and techniques for CSR assessment.
The purpose of this study is to review the issues of CSR assessment and reporting in the aviation industry. This study provides a brief survey of the recent literature on CSR assessment techniques and raises discussion on the effectiveness of CSR reporting standards in the aviation industry. This study indicates that CSR assessment can be divided into techniques for rating and self-assessment. The article also presents a theoretical basis for the formation of CSR assessment techniques for airlines and airports. The application of Fuzzy Theory to the formation of criteria for the assessment of a company's CSR activity reporting within the European Union and Eastern European region is discussed. The proposed approach could be used by air transport stakeholders, interested in making investment decisions.

Peer-review under responsibility of the scientific committee of the 8th International Conference on Air Transport – INAIR 2019, GLOBAL TRENDS IN AVIATION

Keywords: corporate social responsibility; airline; airport; assessment techniques

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2352-1465
Peer-review under responsibility of the scientific committee of the 8th International Conference on Air Transport – INAIR 2019, GLOBAL TRENDS IN AVIATION
10.1016/j.trpro.2019.12.023

1. Introduction

Embodying the UN vision of sustainable development, a definition for air transport sustainability was proposed at the ICAO Air Transport Symposium (IATS) (ICAO 2013). Thus, a sustainable air transport system 'should be affordable, should operate safely, securely, efficiently, and should offer choices of air services while supporting a competitive economy and balanced regional development' (ICAO 2013: paragraph 2.2). Bhinekawati (2017), Jessalynn (2015), Bijlmakers (2019) and many other researchers, referring to regulatory documents, for example, Euro Com (2002), consider the implementation of sustainable development and growth policies in the light of the Corporate Social Responsibility (CSR) of businesses. Mullerat R. (2013:5) believes that 'Through CSR, corporations importantly contribute to the EU's treaty objectives of sustainable development and a highly competitive social market economy'.

CSR emerged as an area of academic interest and as a management discipline in the 1970s (Carroll 1991), where managers applied traditional management approaches to addressing CSR issues. The idea of CSR is being actively promoted in developed countries such as the UK and the United States (Carroll 2008, Danshina 2017). The European Union has several official publications that define CSR strategy (EU 2019), which the EU is also trying to promote in developing countries that are not members of the Union but have the prospect of becoming good economic or political allies. For example, as stated on an official website of the European Union (2019), Ukraine is a priority partner for the European Union, within the EU's Eastern Partnership. The Ukraine-European Union Association Agreement (EU 2014) is the main tool for promoting closer economic affairs and respect for the values of a democratic society. In according with the above document, Ukraine has committed itself to increasing commitment and participation in CSR. In Part 3 of Art. 293 it is agreed that 'the Parties shall strive to facilitate *trade in products that contribute to sustainable development*, including products that are the subject of schemes such as fair and ethical trade schemes, as well as those *respecting corporate social responsibility* and accountability principles' (EU 2014).

The topic of CSR implementation by following the example of foreign countries, in particular the EU, is increasingly being discussed in the academic circles of the non-EU countries in the Eastern European region (for instance, Romanykha (2016), Bikeeva (2017), Danshina (2017), Karpenko (2018)). However, as part of a CSR investigation in Ukraine (Zinchenko et al. 2018) it was concluded that the practice of reporting on non-financial issues has not become common practice and the average level of CSR disclosure on Ukrainian companies' websites remains low. Julia Gerasymchuk, financial manager at Ukraine International Airlines, in her interview for the authors of this article noticed that "the topic of CSR is absolutely essential for Ukrainian airlines and airports. At the same time, it definitely requires much more promotion in terms of understanding its true importance and impact among companies' leaders as well as general public, including passengers and all sorts of institutions. Certain shift in mindset is required at top-management level – to recognize broader company responsibility, promote sustainable values and lead by example".

Several studies, such as Bhinekawati (2016), Bijlmakers (2019), Sullivan (2017), Chakrabarty (2011), Strauss (2015), have already been written about the challenges of applying the CSR concept caused by different levels of economic development, cultural diversity and rather broad definition of social responsibility. Nevertheless, a common problem for all economies is still the techniques of CSR assessment and reporting. In management theory the greatest attention has been given to the assessment system, efficiency criteria and data reliability on the activities of the enterprises. However, considering the broad and complex definition of CSR, theorists and industrial experts recognise that existing methods for CSR assessment are in the initial stages of development (Giannarakis 2016, Hopkins 2005, Koep 2017, Güreş et. al 2017, Stevenson 2016).

For a better understanding of these issues, suppose that aviation services consumers are interested in the social responsibility of the airline or airport. Short examples of the information that can be found in a free access are provided below:

- British Airways, Heathrow Airport Limited, Cardiff airport and Manchester Airport Group are the members of Business in the Community network; Heathrow Airport Ltd and Manchester Airports Group are the finalists of The Responsible Business of the 2019 Year Award (BiTC 2019);

- in 2018 RobecoSAM's announced ANA Holdings Inc with the total sustainability score 78 as a leader in the airlines industry (RobecoSAM AG 2018);
- TUI is listed on Dow Jones Sustainability Index (DJSI) and the FTSE4Good Index with the average score of 4 (TUI 2016, TUI 2018);
- CSRHub website measured EasyJet plc CSR / ESG Ranking as 81%, Aeroflot – 47 %, Wizz Air Holdings Plc – 38 % compared with 17,287 companies (CSRHub 2019).

Most likely, the above data are insufficiently informative and transparent not only for consumers of air services and experts alike, a but additionally they are practically incomparable for making investment decisions. Therefore, the issue of CSR assessment and reporting; its methodology and techniques require further research and improvements.

This study provides a brief a review of literature on CSR assessment and reporting techniques, as well as furthering discussion on the effectiveness of CSR reporting standards in the aviation industry of the European region. The article also presents a theoretical basis for the formation of a CSR assessment criteria for enterprises operating in the air transport market. The foundation of the suggested approach is the application of Fuzzy Set Theory in the formation of criteria for the assessment of a company's CSR activity.

2. CSR Assessment and Reporting

2.1. Key assessment tools and techniques

Traditionally, tools and ratios of financial and project analysis are used to assess the possibility of trust and investment in the company (Vasigh et. al 2015, Graham, Morrell 2016). It should be noted that in many project documents and recommended practices, these approaches are widely used (for instance, Government of Bermuda 2016, UK Department for transport 2018). CSR reporting, unlike financial statements and tools, is intended to develop a holistic vision for investing and understanding how consumed resources are used. In contradistinction to project analysis, where the impact of a particular project on the environment or society is assessed, the CSR approach aims to assess or evaluate the company's contribution to a holistic development of society over a period of time. From the theoretical perspective, the indices of CSR or 'corporate sustainability or business ethics or business in society or corporate citizenship' (Hopkins 2005), should help investors and the public to make decisions about trust and possible investment in the company (Grayson, Hodges 2017). In actual practice, several independent agencies offer CSR assessment and ranking services. The agencies mentioned relevant recent studies, position themselves as a platform for establishing business relations or leaders in evaluating investment (or responsible investment) and managing them in the market of developed countries. Among the main agencies are: Business in the Community, RobecoSAM, KLD Research & Analytics, Inc., Calvert Research and Management. All listed companies use different, designed according to their internal criteria indices for corporate sustainability assessments, awards and benchmarking solutions. To have an idea of the diversity of indices and factors used by these agencies in evaluating companies' CSR, a brief description of the main CSR measurement systems is given below.

Business in the Community, BiTC (1982, UK). The business-led membership organisation dedicated to responsible business. For CSR assessment BiTC has developed the Corporate Responsibility Index (CRI). BiTC uses the Integrated Reporting (IR) framework devised by IIRC, which is an organisation founded by The Prince's Accounting for Sustainability (IIRC 2013). CRI is based on the following key quantitative information: the number of employees, revenue and number of countries in which the organization operates; cost containment and revenues; revenue and cash flows; tax payments; waste (including emissions); carbon emissions caused by products the organization manufactures and labour practices of key suppliers; water use. In addition, qualitative information is used to assess company's social responsibility, for example, employee morale, organizational reputation, customer satisfaction, brand loyalty. Access to the BiTC's CSR assessment system is paid and membership core packages cost from £4,000 + VAT to £10,000 + VAT (BiTC 2019).

RobecoSAM (1995, Switzerland). RobecoSAM provides services for asset management, Sustainability Indices and corporate sustainability assessments, benchmarking solutions (RobecoSAM n.d.). This agency uses DJSI index family and S&P Dow Jones Indices (S&P DJI). Only the top ranked companies within each industry are selected.

RobecoSAM selects the relevant criteria in each sustainability dimension depending on the company. For example, for ANA Holdings Inc. the criteria were developed for the following key activities: fleet management and efficiency; climate strategy and operational eco-efficiency, environmental policy and management systems; passenger safety, labour practice, talent attraction and retention for social dimension (RobecoSAM AG 2018).

KLD Research & Analytics, Inc. (United States, 1988). KLD Research & Analytics, Inc. offers performance benchmarks, corporate accountability research, and consulting services. The agency carries out ESG research for institutional investors and suggests MSCI KLD 400 Social Index. This index is a capitalization weighted index of 400 US securities that provides exposure to companies with ESG ratings and excludes companies whose products have negative social or environmental impacts. The key factors used in the methodology MSCI Inc. (2019) such as book-to-price, earnings/dividend yields, long-term reversal, leverage, earnings variability/quality, Beta mainly related to the financial sector.

Calvert Research and Management (United States, 1976). Calvert Research and Management deal with management and assessment of responsible investing and suggests the Calvert Responsible Indexes. Calvert selects Index components from the Index Universe that operate their businesses in a manner consistent with the Calvert Principles for Responsible Investment (the "Calvert Principles") (Calvert 2018). The key factors are the most recent closing prices of companies, the number of shares and foreign exchange rate to convert price into the Index Currency (USD) (Calvert 2018).

2.2. Evaluation and review of tools and techniques

It is noteworthy that the above indexes are used to rank certain groups of companies. The methodology for selecting companies and determining the rating is only partially disclosed, therefore the measuring indicators are often not specified. It is not surprising that many researchers became somewhat discouraged when studying the essence of the proposed CSR methodologies. For example, examining six CSR assessment systems (The Global Reporting Initiative (GRI), Accountability, FTSE4good, BiTC, DJSI, Business Ethics 100), Hopkins (2005) concluded that due to complicated methodology it is not always clear what is measured; detailed indicators are rarely given; and assessment systems are commercially oriented; therefore, data is not available, which makes it difficult to test the technique by other analysts.

Giannarakis (2016) analyzed ten Socially Responsible Investments (SRI) indices and found nine assessment challenges. The main difficulties, such as ambiguous criteria and weighting indices for each CSR dimension and lack of transparency, correspond to the problems that were mentioned by Hopkins (2005). The issues of transparency in agencies' assessment approaches are also raises in Saxena's investigation (2016), which is devoted to the CSR concept development in India. Saxena (2016) notes that the local implementing agencies 'do not make adequate efforts to disclose information on their programs, audit issues, impact assessment and utilization of funds'; 'The guideline is still at a nascent and amateur stage'. As a result, this leads to another problem, specifically weak information content and communication between businesses and society (Saxena 2016, Giannarakis 2016).

2.3. Methodological issues and current proposals

Some authors have proposed scientific approaches to the formation of a methodology for assessing CSR. For instance, for evaluation of Chinese airlines CSR, Wang et al. (2014) suggested the following performance indicators: ratio of return on equity; growth of net profit; average price; on-time performance; accident rate; flight frequency; growth of employees revenue; employees revenue (total employees revenue/total operating revenues); tax performance; environmental protection investment; donation contribute and sponsorship (total expense of donation contribute and sponsorship/total operating revenues). The use of information entropy theory, to get the relative importance of performance measures was also proposed and suggests a novel entropy-grey analysis for CSR evaluation. Such an approach could be used in compiling airline ratings for airline CSR activities. Wang et al's (2014) approach is very interesting and understandable from the point of view of the desire to create a reasoned algorithm for ranking airlines using quantitative data. However, it should be notes that, the authors did not clearly define the concepts and content of CSR 'performance measures' and 'criteria' when describing the research methodology (Wang et. al 2014: 58), which complicates the analysis and understanding of the results of the

proposed model. Another challenge mentioned by Wang et al. (2014), is that the CSR framework used is theoretically weak, and the CSR performance indicators require more rigorous theoretical justifications. Discussion and development of models and frameworks to support the evaluation of CSR reporting is ongoing. Cowper-Smith and de Grosbois (2011) developed a framework, specifically for analysing airline CSR reporting. The framework consists of two dimensions – the Environmental and the Social and Economic – and 11 themes drawn from the Global Reporting Initiative (GRI n.d.), United Nations Environmental Programme and World Tourism Organisation. This is in contrast to Wang et al. (2014), who identified five dimensions – shareholders, customers, employees, government and the general public.

2.4. Socially Responsible Investment

Recently investigators have examined the effects of socially responsible activities on the financial performance of a company. Kang et al. (2010) studied the impacts of CSR activities on financial results of some industries related to tourism using a pooled liner regression model. Return on assets (ROA) and return on equity (ROE) were considered as dependant variables for a model of airline industry to measure profitability and Tobin's Q and price earnings ratio (PER) were chosen as a proxy for firm value. The following independent variables were used in the proposed regression: PCSR and NCSR represent positive and negative CSR activities respectively measured by KLD STAT; SIZE represents a firm size measured by the log of sales; LEVERAGE represents a firm's capital structure measured by debt-to-assets ratio; MARKET represents market condition, measured by average monthly S&P500 Index for each year, and subscript, t, indicates the time period. PCSR and NCSR were included in the model as interest (main) variables. As a result of the study of the CSR data from KLD STAT, Compustat database and web site, Yahoo! Finance, the authors built a model for the airline industry, which made it possible to determine the impact of positive and negative CSR on profitability. In contrast to other studied sectors, such as hotels, casinos and restaurants, for the airline industry, the existence of a negative impact of positive CSR activities and no significant impact of negative CSR activities on profitability were founded; whereas, negative CSR activities have a negative impact and no significant impact of positive CSR activities on airline's value. Based on the findings of the Kang et al. (2010), it can be assumed that the costs of airlines for CSR activities were significant in the study period and could be the reason for the decline in profitability in the short term. However, in our opinion, it should also be thoroughly considered how the main variables – PCSR and NCSR – were obtained. Referring to the MSCI (2015) document, which sets out the ESG research methodology, it is possible to approximately estimate the degree of uncertainty of indicators and corresponding judgments based on data of KLD STAT. In the MSCI methodology 'for the MSCI ESG Ratings model, every company is typically scored on only 4-7 of the most material ESG key issues for its primary industry… Each key issue is scored on a 0-10 scale. The key issue score consists of an exposure score and a management score - both also on a 0-10 scale'. If a company meets the assessment criteria established for an indicator, then this is signified with a '1', otherwise this is signified with a '0'. The MSCI ESG KLD STATS indicators are described in the MSCI guide (2015) in general terms, which makes it difficult to understand how valuation judgments occur. For example, 'Companies that have *strong* programs and performance in reducing toxic emissions score higher' (MSCI 2015:17). Most likely, the company's CSR manager will ask the question, what is meant by the term 'strong' programs and results? Regulatory Compliance (ENV-CON-B) negative environment performance indicators is defined more specifically as 'Companies that averaged $40,000 or more in settlements, fines, and/or penalties during this period received a score = 1' (MSCI 2015: 21). However, from a research and practical point of view, it would be interesting to understand why the average amount of penalty payments is defined as $40,000.

2.5. Issues for airlines and airports

The approaches and indices discussed above, concern the compilation of companies' evaluations and rankings for their contribution to socially responsible business practices. However, before participating in an evaluation and ranking process, it is natural that airlines and airports would like to have appropriate tools to conduct self-assessment of their CSR activities. One of the open sources describing the methodology of self-assessment of the level of development of the company's CSR is the Global Reporting Initiative (GRI, n.d.). GRI's recommendations seek an assessment of the CSR across the economic, environmental and social dimensions of sustainability. In 2018

International Consolidated Airlines Group, S.A. (IAG) worked with the GRI and the International Air Transport Association (IATA) to develop a GRI Sectorial Guidance Handbook for airlines (IAG 2019). The described in IAG annual report (IAG 2019) issues were identified on the following aspects (themes): environment (climate change, including emissions, fleet modernisation, fuel efficiency and sustainable aviation fuels; energy use; waste); noise (local economic impacts; air quality; community engagement and charitable support); workforce (employee satisfaction; diversity and equality; talent management); future competitiveness (financial performance; customer satisfaction; carbon pricing innovation; research and development); corporate governance (compliance with legislation and regulation; supply chain management).

It is worth noting that above themes fit into the strategic goals of ICAO. In turn, ICAO's strategic goals reflect 15 of 17 the UN's SDG's. The participation of any aviation businesses in the implementation of ICAO's strategic goals is an important contribution to CSR in terms of the widely recognized significant role of ICAO in the development of civil aviation. Given the different aspects of CSR reporting proposed by the UN, GRI, ICAO and IATA, the airlines' and airports' CSR reporting technique could be improved by further integration and harmonization of relevant recommendations of the above organizations.

IAG (2019) reporting traces the idea of moving from a purely descriptive, qualitative assessment of CSR to the creation of measurable, quantitative performance indicators. This is quite a positive point, since, for example, such indicators can already be found in the Aeroflot's (2019) reporting, especially regarding the environment and climate theme, therefore, it is already possible to conduct a more or less transparent comparative analysis. However, the use of the proposed performance indicators still does not solve the problem of benchmarking completely, and therefore it is natural to conclude that it is necessary to develop a number of ratios that will allow the indicators to be normalized.

Even though the main players in the European aviation market apparently decided to stick to the GRI concept, analysis of some annual reports, for example, LHR Airports Limited (n.d.), IAG (2019), Aeroflot (2019) shows that the issue of measuring and comparing the results of the company's CSR remains open.

Overall, there seems to be some evidence to indicate that the existing CSR assessment techniques most often come down to setting ratings of a certain group of companies, which is more likely discriminatory in relation to small and medium-sized businesses. CSR assessment and participation in the rating process requires an additional cost item, which potentially contradicts the low-cost model, which by offering more affordable air transport, provides one of the most significant way to sustainably develop the aviation market. In addition, the lack of transparency in the methodology and assessment methodology narrows the possibilities for self-assessment, independent expertise and benchmarking. CSR criteria should adequately reflect both mandatory (hard) industry requirements and the interests of airlines in a particular country.

3. Suggested approaches to the formation of the CSR assessment criteria

As noted above, CSR assessment and rating of airlines and airports are increasingly necessary for making investment decisions. The literature review has shown that concepts, assessment techniques, indicators and criteria for evaluating CSR are under ongoing development. The current position of airline and airport CSR reporting in emerging economies, indicates a lack of commitment to recognizing and addressing the negative consequences of aviation business activity on countries less able to resist and manage those impacts. This in turn highlights the challenges in creating a universally relevant model for airline and airport CSR reporting. Analysis shows that for practical, effective implementation, the assessment system should be as clear and transparent as possible.

Based on the review and preliminary studies it can be concluded that there is an emerging call from regulatory authorities, aviation business and investors to improve decision-making tools for long-term investment decisions. In addition, a single approach to understanding and evaluating aviation businesses' CSR can contribute to the smooth integration of emerging and developed markets in the wider European region with the goal of improving the sustainable development of the air transport market. To answer the above call, it is proposed to conduct further research to support the development of CSR assessment at micro and macro level. EU CSR practices will be used as a benchmark with airlines and airports in the non-EU Eastern European region used to test and evaluate the proposed tool.

A number of processes can be conducted to develop a CSR assessment tool including, PESTLE analysis, identification of the performance indicators, measures and criteria for incorporation in a framework or model (Fig.1). The key stage - identification of criteria - is poorly studied in the scientific papers and continues to be debated.

Most studies in the field of CSR assessment begin with identification of a framework (dimensions and themes) for performance judgments about the level of sustainable activities of the organisation. For aviation businesses, the framework is likely to be determined by the interrelated goals of sustainable development of the UN, ICAO, CAA and CSR of the enterprise itself. It should also be recalled that the ICAO (2013) clearly defines the key barrier for sustainable development of air transport which is 'its geographical, regulatory, and economic fragmentation'. In addition, in ICAO (2013) we can find some framework (themes) for CSR report, namely: affordability, safety, security, fairness and efficiency, and air services while supporting a competitive economy and balanced regional development. Further, for the established dimensions and themes, performance indicators and measures should be developed. It is very important that these performance indicators reflect the contribution of the air enterprises into sustainable development and allow further comparison within the industry. In the assessment technique it is also desirable to include success criteria to which would be general for the world aviation market and more specific regional criteria that reflect problems in the particular regions and countries.

<table>
<tr><th>Research question</th><th>Level</th><th>What to examine</th><th>Research Methods</th><th>Participants</th></tr>
<tr><td>Outlooks for the development of the aviation businesses' CSR policy</td><td>macro (region, county)</td><td>Legal, economic and social incentives and obstacles to the development of the aviation businesses' CSR</td><td>PESTEL Analysis, expert interviews</td><td rowspan="3">Stakeholders' Experts</td></tr>
<tr><td>Identification of framework in order to further harmonize the structure of the CSR report for the aviation businesses' self-assessment system</td><td>macro</td><td rowspan="2">Relevant CSR topics in policies and strategies for the development of the transport system and, in particular, the air transportation market.</td><td rowspan="2">Content analysis of ICAO, IATA, GRI, CAA, etc. relevant documents and expert interviews</td></tr>
<tr><td rowspan="2">Identification of a set of significant indicators and partial criteria for the aviation businesses' CSR assessment</td><td>macro</td></tr>
<tr><td>micro</td><td>CSR themes in annual reports and strategic documents of airlines and airports</td><td>Content analysis of annual reports and expert interviews; expert assessment methods</td><td>Experts of airlines and airports</td></tr>
<tr><td rowspan="2">Identification of the set of rules for the formation of the investment rating score (index) of the aviation businesses' CSR</td><td>macro</td><td rowspan="2">The established and promising practice of value judgments on the level of CSR development in airline and airport</td><td>Content analysis of expert interviews</td><td>Stakeholders' Experts</td></tr>
<tr><td>micro</td><td>Expert assessment methods</td><td>Experts of airlines and airports</td></tr>
<tr><td rowspan="2">Aviation businesses' CSR assessment system simulation; testing and evaluating of the rating tool</td><td>macro</td><td>Adequacy of the system of fuzzy inference for the case of determining the investment rating of airlines and airports</td><td rowspan="2">Fuzzy theoretic approach</td><td rowspan="2">Experts of Stakeholders, airlines and airports</td></tr>
<tr><td>micro</td><td>Adequacy of the system of fuzzy inference for the case of determining the level of fulfillment of tasks on CSR of aviation businesses (self-assessment)</td></tr>
</table>

Fig. 1. Proposed blueprint for further research.

To support the development of a more holistic appreciation of the interrelation between CSR at a macro and micro level, this study proposes the use of PESTEL analysis to audit the macro-environment of the organisation. This stage helps also to create an airline or airport's CSR assessment technique based on identifying current high-level macro factors within the countries of registration or principle operation of the airline or airport that may influence their approach to CSR. These can be used as a reflective tool for both formation of CSR assessment system and analysis of reporting. The application of this analysis at a preliminary stage can help predict the main obstacles of implementing the CSR assessment system, this is especially important for developing countries, and also selects the most important CSR indicators for a given region. For example, Stevenson (2016) demonstrated how the application of PESTLE analysis could explain the differences in vision and approach to the CSR reporting of airlines in developed and developing countries. The study (Stevenson 2016) shows that CSR reporting in the airline industries of Brazil, Russia and the European Union are at different stages in their development, and that these

differences are exacerbated by the particular PESTLE contexts in which the airlines operate. Given the high degree of ambiguity of concepts and value judgments in the practice of CSR, it is proposed to use Fuzzy Sets Theory to determine the criterion of successful activities of aviation businesses in contributing to the sustainable development of the industry. The key rationale underpinning the application of this approach is presented in Fig. 2. Primarily, for the criterion formation it is important to build the membership function, which reflects the opinion of experts and determines the range of values for each indicator of CSR included in a certain area of terms used for the linguistic variable.

The tools of the Fuzzy Sets Theory and Fuzzy Logic are well studied, described and successfully used in many areas of management (Lazzerini et al. 2000, Shtovba 2007). As known, a composition of single fuzzy judgments about CSR indicators is connected by AND, OR, NO operators, and as a result, fuzzy rules can be obtained for certain criteria regarding successful CSR activity or contribution into sustainable development. Fuzzy rules are combined into one or more sets at the input (assumption) and are associated with a fuzzy set at the output (consequences). A fuzzy inference is, approximations of the 'input-output' dependence based on linguistic judgments <if-then> and logical operations on fuzzy sets. As a result, a fuzzy inference, for example, a ranking of airlines, can be gotten according to given indicators, criteria, MFs, fuzzy rules and methods of fuzzy inference (Shtovba 2007). This approach, in our opinion, will support the successful resolution of the problem of creating a generally applicable methodology and relevant techniques for assessing CSR with the transition from fuzzy, descriptive conclusions about the contribution of an airline, or airport, to the sustainable development of society, to formalized, reasoned conclusions, thereby allowing a more transparent and meaningful rating and corresponding ranking.

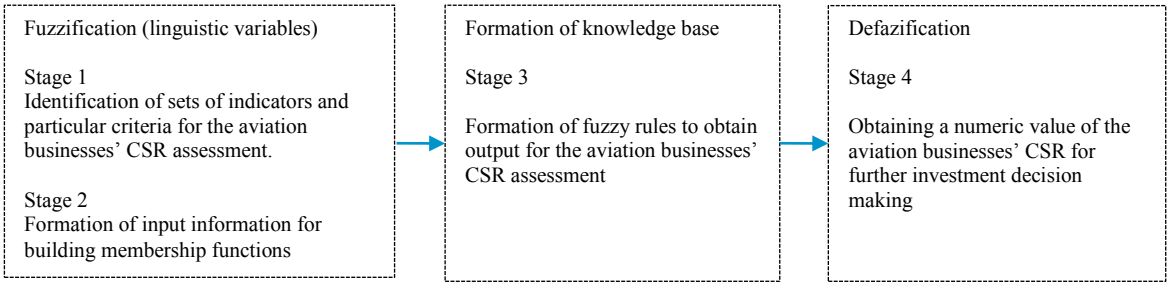

Fig. 2. The general scheme of the fuzzy inference system for the simulation of the airlines' and airports' CSR assessment system.

Conclusion

In seeking to address the challenges of applying CSR caused by its broad definition, and the economic, political, cultural and sectoral diversity discussed in this study, it is now possible to state that CSR can be a useful strategic focus for airlines and airports, subject to the creation of transparent, disclosed assessment methodologies that allow a comparative analysis for all interested stakeholders.

Generally, existing CSR assessment techniques most often come down to ratings of a certain group of companies, which is more likely to discriminate against small and medium-sized businesses. This study suggests that the methodology of CSR assessment aviation businesses should include PESTEL analysis as a base for further identification of framework, indicators, measures and criteria on macro and micro level for self-assessment and independent ranking. The GRI tool should be evolved and investigated further to resolve the issue of measuring and comparing the results of the company's CSR. The economic, environmental, and social GRI dimensions could be associated with ICAO themes of affordability, safety, security, fairness, efficiency, and air services for balanced regional development. It is very important that the performance indicators of CSR reflect the contribution of aviation businesses to sustainable development and allow further comparison within the industry. In the assessment technique, it is desirable to include success criteria in ensuring the reduction of "geographical, regulatory and economic fragmentation". The criteria in turn, could be divided into general for the world aviation market and criteria that reflect the successful solution of the problems in the particular regions and countries.

The CSR assessment of airline operations is too complex a process for analyzing using generally accepted quantitative methods. Frequently available sources of information on sustainable development and CSR of aviation businesses are interpreted qualitatively, inaccurately and indefinitely. Fuzzy Sets Theory and Fuzzy Logic, on which fuzzy control is based, are closer in spirit to human thinking and provide effective means of displaying the uncertainties and inaccuracies of the real world. The presence of mathematical tools for reflecting vagueness of the initial information could allow experts to construct a system for evaluating CSR of airlines and airports that is adequate to reality.

Acknowledgements

We would like to express our deep and sincere gratitude to the financial manager of Ukraine International Airlines Yulia Gerasimchuk for the opportunity to discuss CSR issues in the aviation businesses and for providing a valuable expert interview for further research.

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